The problem with our probiotic love affair...

The mass migration of lifeforms from one place to another has ALWAYS resulted in problems.

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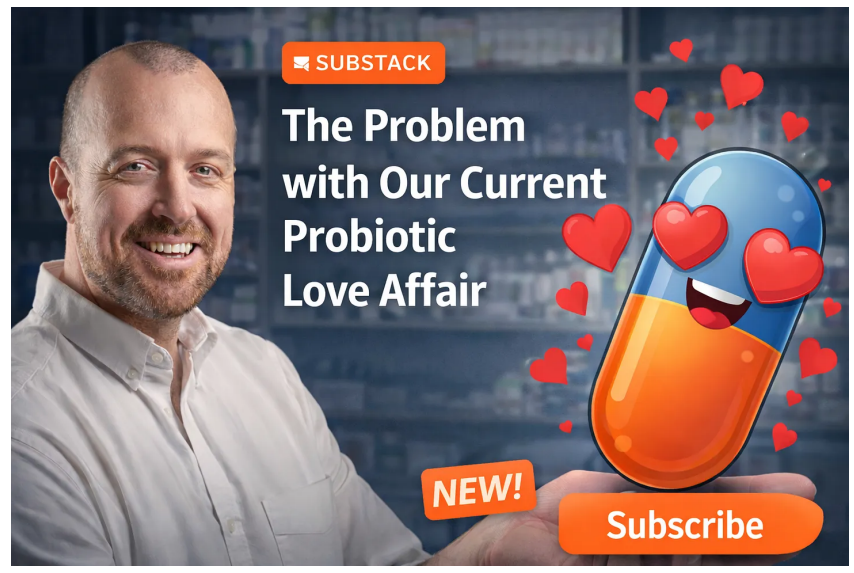

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Many moons ago, a younger, lighter, more naive Conor once lived in sunny Australia. A migrant, of sorts, I moved from Ireland to help build the Guide Dog training program on the West Coast.

While there, we decided to do some whitewater rafting in the hills somewhere near Brisbane. As we lugged our needlessly heavy wooden canoes up the greasy mountainside, our group leader, a local conservationist by the name of “Rabbit” (I didn’t ask, but I sensed he wanted me to) suddenly stopped, pointing at something among the wet roots.

“Ya little bugger”, he roared in perfect Australian, “sorry folks, he has to go ”.

Unsure if it was a venomous snake or man-eating shark that was stalking us, Rabbit had pounced, paddle aloft, and proceeded to batter to death the large, seemingly harmless amphibian that only moments before was probably reciting a story to his little ones.

Judging by the collective shock on all our faces, few if any of us had ever even heard of a Cane Toad, though I feel most of us had read Wind in the Willows, so the possibility of seeing a poor wee frog obliterated in such a manner, I feel, should have been better highlighted in the tour pamphlet.

Before that, killing-wise, I had only seen deer shot from a distance. But that was for meat. Killing out of hate is another level entirely. The barbarity of it honestly shocked me.

Wiping his oar on the grass, Rabbit went on to explain that Cane Toads were an invasive species. First introduced to Australia in 1935, they were released *en masse to* control beetles in sugarcane fields. Unfortunately, the beetles lived higher up the plant than the toads could reach, so instead they ate all the bugs on the ground. At that they were VERY effective.

The only issue was that the new residents didn’t just leave when they started kicking ass. They take root. Given enough food and with no control in place (cane toads are toxic when eaten), the toads multiplied explosively. In a matter of decades, they had spread across the continent, outcompeting native amphibians for food and habitats, disrupting food webs and upsetting the locals in general.

Australia has a number of famous invasive species - the Australian Dingo was once a domestic dog, the feral cat, the European fox. We brought them all. In fact, and somewhat ironically, Rabbit himself is a famously invasive species, and I don’t just mean because he descended from a few limeys that were sent to Oz as some form of punishment. I mean more because of his namesake, “Rabbit”.

Before releasing the Cane Toad and in between surfing and throwing shrimps on barbies, the bored new residents released a few European rabbits into the outback to use for hunting.

Now, I’m not sure if you know this about rabbits, but they like to have sex. Like, a lot. I mean, they have sex A LOT.

A female European rabbit is among the fastest-reproducing mammals on land. She can not only make a litter in just 28 days but can become pregnant again within hours of giving birth.

The net result, somewhat inevitably, is an awful lot of babies (50+ a year). A niche requires a number of different types of large predators to keep their numbers in check. Australia has the dingo and not much else. This lead to massive overgrazing, collapse of native plant communities, soil erosion and eventual desertification. Farmers hate them just about as much as the local herbivores do.

And this seems *always* to be the way. It doesn’t matter if you’re Will Bryan who brought Indian mongoose to Hawaii in the early 1800s to control the rats that were introduced accidentally by Polynesian explorers 1,000 years previously or Eugene Schieffelin who released starlings into Central Park, New York, as he apparently wanted to see every bird mentioned in Shakespeare; it doesn’t matter if you’re a professional outfit like Kew Botanical Gardens in the UK bringing in beautiful (but highly invasive) water lilies and hogweed or the amateur wildlife managers setting free their unwanted pet Burmese Pythons into the Floridian everglades to eat up to 99% of the land mammals in the area; given enough food and no control, a release of non-native lifeforms into a new niche, purposeful or otherwise, more often than not results in massive disruption (aka, *un-balance*; aka, *dis-ease*) to the area.

Other times it’s a simple numbers game...

When it comes to ecological disruption, it’s not always the arrival of an entirely new species, sometimes it’s a simple numbers game - more of us in the area means less of

you.

I'm a proud Irishman and we will be forever thankful to America for taking us in. Back in the 1850's, around a million desperately poor and starving Irish people fled British persecution to New York and Boston and surrounding cities. Up until today, it was the fastest demographic transformation any city anywhere had experienced. They were poorly prepared for it. Like any niche hit by a sudden population surge, the influx led to desperate overcrowding and resource scarcity. Sanitation breaks down. Soon cholera and typhus were rampant. With the desperately poor working for virtually nothing, soon the labour market collapsed, leading to homelessness, petty crime and administrative overload. Despite this rocky start, for good or bad, not a century later, we were running the place (all eight of JFK's grandparents were Irish emigrants).

These days, Americans are clearly proud of their Irish heritage but at the time of our greatest influx (the U.S. didn't have immigration restrictions until the 1880s), the locals in the bulging cities no doubt had a few very justifiable grievances. Soon, the Know Nothing movement began pushing anti-Catholic, anti-Irish positions. The locals started fighting back, Gangs of New York style.

Didn't stop us, though. As with all the invaders above, we kept coming *despite* the locals because to survive and thrive is as much baked into our DNA as it was into the poor little toad on that tree stump. It's been like that since we were slime. Whether out of adventure, greed, or sheer necessity, we love a good usurping.

But we're not the *best* at it. That title goes to something far, far smaller.

In terms of niche dominance, bacteria rule...

Bacteria are, hands down, the most important life form on the planet. Without them, food chains would collapse and most complex life would follow. None of us could survive without their help... and we humans spent the last century hating them.

It's crazy to think we have only been walking upright for 4 million years or so compared to bacteria who have been in that form for 4 *billion*.

(To give that figure some context, 4 million seconds is around 46 days. 4 billion seconds is around 127 years).

That's a *lot* of time to learn a few tricks. One of them is the variety of chemical and electrical communication strategies they use to mass-organise their labour and growth. Much like how our own brains work, these strategies combine to make the sole bacterium not just one cell but millions, shifting from an insignificant force to an insurmountable one. They can time their reproduction, direct nutrient flow, maintain their surroundings, manage waste, prepare defensive batteries and conduct a variety of attacks, all depending on the collective need. Each little colony a tiny community fighting for survival.

They want to survive as much as we do. And when the enviornment offers them any sort of an advantage, they take it.

What is a *pathogen*?

Last year I gave a talk called Yeast Wars. It was an introduction to the world of yeast, the other "half" of your gut biome (by cell numbers, fungi are actually only a small fraction of your gut microbes — probably under 1% — but they're much larger, often hundreds of times greater in volume).

Yeast had a bad rep. The word always seems to be followed by "infection". Much like the other flora in your gut, in their correct numbers, yeast are just as vital to your health and sadly just as destructive when they get out of hand.

The talk explains that any life form can act as a pathogen when it's in the wrong place at the wrong time and, crucially, in the wrong numbers.

Take *E.coli,* for example. He's a bad guy, isn't he?! But did you know that *E.coli* are one of the first bacteria to populate your baby's gut? All part of that messy birthing process. And it's lucky they do. *E. coli* is a facultative anaerobe, meaning it can live in oxygen-rich or oxygen-poor environments. When oxygen is present, it happily uses it, inadvertently making way for the rest of the anaerobic species that make up the vast majority of our gut flora.

Cholera has a bad rep, but the organism that causes it, *Vibrio cholerae*, in its normal environment (the aquatic realm) is a keystone species, gobbling up all the impossible-to-digest chitin, one of the most abundant proteins on earth (think marine exoskeletons), turning it into sugar for the rest of us to enjoy. Not so bad! Just don't drink too much of him when you're desperately ill.

There are several hundred species of *E.coli* out there, most of them benign, many of them beneficial. You can count the truly nasty on one hand.

And do you know where most of the bad ones come from in our food chain? The guts of animals that live, suffer and die in "modern" industrial meat production.

Today, instead of cows grazing in fields, we confine them and feed them grain. However, grain is an unnatural food source for cattle. It causes the cow major issues, one of which is acidification. This, in turn, fosters the growth of acid-resistant *E. coli*. In one study, grain-fed cattle had roughly one million-fold more acid-resistant *E. coli* per gram of digesta than normal hay-fed animals.

These are the fellas that cause us the issues - if they're resistant to acid, they won't dissolve in our stomach juices and can thus cause us problems downstream in the intestines. So you take antibiotics, napalming the gut flora. Well, yeast *loves* this as normal levels of *E.coli* keep yeast in check. Remove *E. coli*, and yeast can expand. Have thrush and took some anti-yeast medication? Expect a surge of *E. coli.*

Yeast isn't a *bad guy* any more than the *E.coli* is, in its normal numbers. Your ear *always* contains yeast. It's supposed to be there, recycling fats, stimulating local innate immunity and keeping some bacterial communities down. But some disruption has occurred, and now they're present in such numbers that their normal activity is causing issues.

In most cases, it's far more accurate to look at pathogens as symptoms of *dis-ease,* not the disease itself. It's certainly the route to healing.

The problem with our current love affair with probiotics...

Most of us are now thankfully turning our backs on heavy *anti*biotic use. Whoopsie! Started great, saved an awful lot of lives while sanitation was not up to scratch, but now they're surely doing more harm than good in the West.

On the plus side, this has given rise to the *pro*biotic market, and business is booming. Countless studies are now published daily in the field. So many, in fact, that a course I recently prepared on probiotics has been revisited so many times that today it looks entirely different to how it started just three years ago. I'm actually slow to release it, knowing another revelation is just around the corner.

Here's where I am currently with probiotics - once a loyal supporter, I am now increasingly looking at probiotics as I do antibiotics - absolutely, I'll use them, if I have to (although these days it's a sprinkle of S.boulardii or, if that fails, FMT. That's another article), it's just now I'm trying more and more not to do so.

Let's take the poor Irish emigrants as an example - with the borders wide open (economic demand for cheap labour strongly outweighed public health fears), a mass vaccine campaign for Cholera is just one part of the puzzle. A triage. It doesn't address the underlying *cause* (too many poor people, too quickly, overburdened services).

But you know what definitely won't help them? Piling in a load *more* people without careful thought.

You might argue that some doctors specialising in infectious disease might be useful. So, having deliberated over the decision about as long as the chap that introduced the cane toads, you pile in 100,000 of them to help the cholera sick. They get to work immediately, healing the ill. At that, they are very successful.

But these doctors don't know how to dig fresh wells or fix the sewage issue that brought them there in the first place. That's someone else's job. And by the time you wonder how much poo comes out of a hundred thousand infectious disease doctors, they have become one million infectious disease doctors just 3 hours later.

They don't produce food either; they consume it. So they begin to starve. But worry not, we thought of that! We'll just send in another 100,000! Every. Single. Day.

And it begins to work, sort of. The doctors get a hold. They start taking food from others. They find places to live. Rents in the area go up because they're loaded. Regular folks like builders and tradespeople can't afford to live near the hospitals, so they move away. Without them, the place starts falling apart.

Other groups don't take it lying down - who do these guys think they are?! They fight back. It's turning into Gangs of New York. Normal activity halts. Knives are out.

The poor residents you were initially trying to help, while free of Cholera, have even less food and homes now and are living in a war zone. The *dis-ease* has become multifactorial.

You picked one group with the best of intentions, but you didn't look down the road far enough. The studies are starting to though, and considering what we have learned, the results are not all that surprising.

It seems the good guys aren't leaving, again...

Most commercial probiotics today are based around aerobic bacterial species (meaning they breathe air), chiefly *Lactobacillus* and *Bifidobacterium*.

The vast majority of life in our guts are anaerobic species, meaning oxygen kills them (in humans, anaerobic *Firmicutes* make up 40-60% of the bacteria present, *Bacteroides makes up* much of the rest. Dogs have a similar mix, at the top level, but with more *Fusobacteria* in third position*)*.

Historically, the reason for this is that we could only work with the oxygen-breathing kind in our oxygen-filled labs. They not only replicate easily on agar plates but they're significantly easier to make products out of them.

The problem is, the studies we have been doing are small, often involving less than 10 or 20 patients, they are nearly always very short-term (weeks) and they are *always* very specific - we released some mongoose. The rat numbers are down. The mongoose was successful.

From this point, inferences are drawn on the potential *long-term* benefits of deploying large numbers of said lifeforms to everyone everywhere.

But there are more than 100,00 taxa of largely anaerobic lifeforms all vying for position in there -bacteria, yeast, protozoa, viruses - each one deploying a variety of chemical compounds that TOGETHER work to keep the system in balance. Worse, we are all completely different biospheres. Even identical twins, living in the same home, share just 10-20% of their biome!

And while a number of small studies suggest the effects of probiotics are transient (you stop using them and things return to normal), it's important to remember this is not always the case.

In 2018, researchers wanted to test what happened in the long term when probiotics were used to mitigate potential harm from antibiotics. Following a dose of antibiotics, participants were randomised to receive a standard multi-strain probiotic from the store, an autologous faecal transplant (awesome) or no intervention at all.

Interestingly, those taking the over-the-counter probiotic showed delayed restoration of their native gut microbiome compared to the no-treatment group. The researchers found that in some participants, the probiotic strains used colonised the gut and competitively excluded the person's original microbial community, even after they stopped using them. They concluded that routine probiotic use after antibiotics may impede natural microbiome recovery by reshaping the ecological niche rather than helping it return to its prior state.

We know that many common *Lactobacillus* probiotic strains can trigger immune responses in the host, increasing pro-inflammatory cytokines, such as TNF-α and IL-6. Others show suppressive effects, depending on the specific bacterial strain and host system.

As daunting as this sounds, it very much depends on the context. In some situations, it suggests a vaccine-like stimulation to the body, priming the immune system, enhancing pathogen resistance, ramping up mucosal protection. Good stuff.

On the other hand, in terms of dysbiosis, these can become negative when their signal is excessive, certainly in an inflamed host. Too much of a good thing.

In a study entitled "Addressing safety concerns of long-term probiotic use: *In vivo* evidence from a rat model", the extended use of multi-strain probiotics in rats led to systemic pro-inflammatory responses, including higher levels of inflammatory cytokines and an increased abundance of gut bacteria associated with inflammation. Enlarged lymphoid structures were also observed in the colon after long-term use.

In defence of probiotics, the rats in the above study were dosed for 8 months straight, which, given their short lives, is a very long time. I don't see many people recommending that. But I do see dry pet food products now, including a few strains of probiotics for “gut health”. That’s the same thing. You also see people thinking probiotics are something their pets need every day. You see *feed-daily* supplements that now include a few strains of probiotics, as if they are completely benign.

Might it be that continuously deploying probiotic supplements high in one or strains of *Lactobacillus* or *Bifido*, based on what we have gathered from a handful of tiny, short term trials of largely humans, we risk potentially suppressing ecological diversity in the dog or cat?

Moreover, as the saying goes, sure it was scientifically proven, but what was scientifically proved?!

Most probiotic trials available to us today compare the treatment (a probiotic) against a non-treatment. But what would happen if you compared your pricey probiotic miracle cure for gut-sick dogs (with potential long-term dysbiosis risks) to a simple, cheap, proven and VERY SAFE pinch of German chamomile?! There are literally *thousands* of studies on chamomile proving it fantastic for tummy troubles (and it 100% does not hang around after causing mischief).

Or, dare to dream, compare the probiotic to a simple, well-thought-out diet plan? *This* offers the patient the best road to recovery - resource the good guys. They’ll get the job done for you (and they’ll do it right).

Probiotics *alone* are not going to fix your pet’s chronic condition...

A thriving gut is very much like a human city, only we understand the latter.

The problem is, while a city of sick inhabitants is *complicated*—difficult to manage, sure, but ultimately surmountable once we map all the parts—a gut is *complex*. Its functionality emerges from countless interacting systems and species, most of which are beyond our comprehension. There are simply too many factors.

The good news is, treating a diseased gut rarely requires fancy tests or machines, powerful drugs or even a whole lot of money. I say that based on the fact so many owners of chronically ill pets have already been through that system and are no better off.

The tools at our disposal are much simpler than that. We must “seal and heal” the gut, as they say, and in that order, using little more than a simple, broth-rich diet, time and perhaps a herb or two. That’s it.

Triage complete, you then move on to determining the cause of the *dis-ease* in the first place (food intolerances, a yeast infection, bacterial dysbiosis, a weird little parasite, one too many antibiotics, stress, an interruption in neuroimmune signalling, environmental toxins, autoimmune dysregulation, with one of the first three being the most likely). This is where healing lies.

Judging by the sheer number of clients we have, most of whom haven’t explored a fresh diet properly (studies show chemically preserved kibble lowers gut microbial diversity and drives gut enteropathy in dogs), it seems both those steps - seal and heal - continue to elude our conventional, analysis-obsessed veterinary sector today, particularly the second, in my opinion.

Too often these animals are “diagnosed” with IBD (aka, the gut wall seems inflamed) and maybe with a SIBO (aka, the gut flora aren’t happy either!) following a battery of incredibly expensive, often very invasive tests, but you are no closer to a cause let alone a solution.

It is into these dogs that holistic health professionals and pet owners alike dump multi-strain probiotics. In fact, these days it seems the more exotic the better. I can’t help but feel uneasy when novel strains of bacteria isolated from an extinct wolf turd or caveman’s butt crack are introduced into a sick environment like this.

The point is not that probiotics are useless. The point is that ecosystems don’t do ‘single-variable fixes’ without trade-offs.

We have been trained to seek the magic pill - what can I put *in* here to fix this.

But when introducing life (or anti-life), we should give their usage a little more consideration. Go easy. Your gut is not a machine. It’s not even a city. It’s a highly complex, living ecosystem.

When it goes awry, blindly choosing one side over another might not give you the harmony you desire. Sometimes you get cane toads.

If you liked my new substack, great! May I commend you on your excellent taste. I’ll be posting a number of free articles up here, a few I have no doubt already posted to Facebook but as it restricts some of my longer, more erratic rants, I thought I would better reach my audience here on Substack. Thanks for the follow and note that I will be releasing Feeding Dogs 2.0 chapter by chapter to my substack. The tighter format and audio files might help those on walkies.

OK, see you down the road!

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Fiona Murray 6d

Liked by Dr Conor Brady

Food for thought. I don't want to introduce cane toads to my dog's gut for sure. I have a healthy intact 6-yr old male, raw-fed since 5 months. Puppy shots only. No chemical parasite treatment. No

antibiotics ever. Fed a variety of clean-sourced commercial raw brands and proteins. Raw meaty bones 3-4 times a week, organic eggs, small oily fish, a small bit of organic leafy green veg, herbs, soaked nuts and seeds, bone broth, Irish kelp and seaweed, clean mushroom powder, a bit of DIY with organs/bits such as pancreas, testicle, spleen, heart, kidneys, lung, tongue. Lovely skin, coat, ears, eyes and teeth. Consistently good stools, 9-10 on the Thompson Stool Scale >95% of the time. You get the gist, a wide variety of good stuff and no clinical symptoms. I got his microbiome tested out of curiosity, not because he was gut sick. I nerd out on this stuff. The report came back in about 12 sections and he scored less than 1/10 in each section. I just didn't buy that based on my dog's history. And the data is diet-agnostic as comparative studies of dry vs raw microbiome studies have not been done. The report suggested everything needed changed to reach the optimum depicted. This was based on patterns associated with gut resilience from population-level data from clinically well dogs and comparative microbiome research. But it does not mean that dogs outside this norm are not healthy. So what does it tell us? One version of healthy. On a large spectrum of many environments. So therefore it tells very little. And certainly is not enough to suggest shifting the microbiome to one version of healthy is the right option. So I loved this article. So much we do not yet know. I am happy with my current choice to continue to feed a wide variety of real food. Thanks

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Micki 6d

Liked by Dr Conor Brady

Love this - thank you for taking the time to share. Seems to be an error in the link to "studies show kibble drives gut dysbiosis and disease in pets" - it goes to https://www.frontiersin.org/articles/10.3389/fvets.2023.1082109/full but I just get a 404 error

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